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THE INFLUENCE OF CAPITAL MARKETS ON AUSTRIA'S ECONOMIC GROWTH

Abstract:

This research undertook a comprehensive assessment of how capital market have affected Austria's economic development, scrutinizing data spanning from 1975 to 2020. In pursuit of this objective, the study meticulously constructed an econometric model utilizing the GRETLE software, a tool known for its robust analytical capabilities in economic modeling. This model was specifically designed to probe the extent to which the capital market have been a driving force behind Austria's economic progress. Once the model was in place, it was applied to the aforementioned dataset using the GRETLE program, allowing for a detailed and nuanced analysis. The results derived from this process were pivotal in establishing a clear and quantifiable understanding of the capital markets' impact on Austria's economic growth trajectory over this extensive period. This comprehensive approach, integrating long-term data analysis with sophisticated econometric modeling, provided valuable insights into the dynamic interplay between capital market fluctuations and national economic performance.

Keywords: OLS, GARCH, GRETLE, capital market, economic growth

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1. Introduction

The capital market plays an indispensable role as a primary channel for gathering financial assets. During this intricate process, issuers of financial instruments secure capital, which is subsequently directed towards fostering corporate expansion. Meanwhile, purchasers of these securities are presented with the prospect of investing their excess funds into ventures that offer the potential for future financial gains (Demertzis, Domínguez-Jiménez and Guetta-Jeanrenaud, 2021, 2-5). This arrangement is particularly beneficial for issuers as it opens up access to a diverse array of prospective investors. On the flip side, investors typically bring a profound comprehension of the issuer's standing and the broader market context, empowering them to make judicious investment decisions. This includes a careful assessment of potential yields and an understanding of the prevailing trends in specific market segments (Bogle, Coyle and Turner, 2022, 370-372; Bajaher, Habbash and Alborr, 2022, 261-278).

Capital markets are primarily engaged with financial instruments that have medium to long-term maturities, signifying that the period for realizing investment returns generally surpasses the initial phase of capital infusion, often extending beyond one year. This trait is instrumental in consolidating considerable capital within these markets, thereby exerting a substantial influence on broader economic activities (Wang, Zhang, Yang and Guo 2021, 2-3; Cunha, de Oliveira, Orsato, Klotzle, Cyrino, Oliveira and Caiado, 2020, 682-695).

Economic expansion is multifaceted, encompassing tangible economic outputs, the quantitative progression of inputs and outputs, and the fundamental mechanisms that propel growth. These mechanisms include social interactions that ensure the maintenance of systemic equilibrium. Hence, the process of growth is not only about the functional and social structure of the economy but also about the institutional framework that governs it. Additionally, shifts in production over time are critical elements that demand attention (Žarković, Četković, Redzepagic, Đurović, Vujadinović and Živković, 2022, 1622-1648; Batrancea, Rathnaswamy and Batrancea, 2022, 1651-1665; Chirwa, and Odhiambo, 2016, 33-37).

This article ventures into the complex interaction between the capital market and economic growth, a topic that has sparked extensive public discourse. Perspectives on this issue are diverse, with some viewpoints highlighting the adverse consequences of financial development on economic stability, while others underscore its constructive role in the efficient allocation of capital and the enhancement of productivity. Particularly in the aftermath of the 2007-2011 financial crisis, which significantly altered the perception of the capital market's advantages, this research takes on added significance.

The primary goal of this study is to evaluate the degree to which the maturation of the capital market impacts the long-term economic growth of Austria, with a focus on the period from 1975 to 2020. The research methodology began with an exhaustive review of relevant literature, drawing from a wide spectrum of sources and empirical evidence. The subsequent phase involved the meticulous gathering and selection of critical statistical data. The culmination of this study involves an econometric analysis, leveraging a specially designed econometric model for precise estimation. This comprehensive approach is designed to provide a deep insight into the role of the capital market in molding Austria's economic terrain over this extended timeframe.

2. The Impact of capital markets on economic growth as explored in scholarly studies.

The exploration of how capital markets affect economic growth, as revealed through various scientific studies, offers an in-depth analysis of the intricate relationship between these two domains. Theoretical investigations have consistently established a significant connection between the dynamics of capital markets and the trajectory of economic growth, a link further reinforced by empirical research examining the impact of financial markets on economic progress (Nordin and Nordin, 2016, 259-265; Bekaert, Harvey, 1998, 33-53; Nazir, Nawaz and Gilani, 2010, 3473-3476). Diverse theoretical perspectives bolster the notion of a symbiotic relationship between capital markets and economic expansion. Under W. Brainard's extended Q-Tobin theory, favorable conditions in the stock market play a crucial role in elevating investment levels, with this theory drawing support from the causality attributed to rising stock prices (Brainard, Tobin, 1968). B. Malkiel's hypothesis suggests that stock exchanges influence economic growth primarily through the wealth effect, which, in turn, stimulates an uptick in consumer spending (Malkiel, 1999). Further, contemporary literature indicates that robust economic conditions favorably interact with stock markets, thereby boosting the perceived reliability of corporations in capital markets and consequently driving up the prices of their individual stocks.

To probe deeper into this theme, the researchers developed an intricate econometric model, later refined and estimated through selected research methods. This study recurrently focuses on the dynamics within distinct national groupings, considering factors like the maturity of their capital markets, the degree of economic development, integration into the global community, and the characteristics of their existing financial systems.

A pivotal econometric model, introduced by R. Levin and R.G. King, serves as a fundamental tool for analyzing the interaction between the progression of financial markets and the economic growth across nations

(King, Levine, 1993, p. 717-736). This model, encapsulated in Equation 1, functions as a regression model aimed at deciphering economic growth patterns:

Equation 1: Economic Growth Regression Model Formula

$$Y_{it} = \alpha_0 + \alpha F_{it} + \beta X_{it} + u_{it}$$

Where:

- Y_{it} - symbolizes the real GDP growth rate per capita for country i in period t ;
- F_{it} - denotes an indicator of financial development for country i in period t , including metrics like the ratio of private sector non-financial loans to total domestic loans, the financial sector's current liabilities as a proportion of GDP, and the domestic deposit to bank asset ratio;
- X_{it} - encapsulates specific explanatory variables impacting the economic growth of country i in period t , such as the ratio of foreign trade turnover to GDP, the ratio of the budget deficit to GDP, and the ratio of government consumption to GDP.

Employing the double least squares method for estimation, this model allowed for the substitution of GDP per capita with other indicators like the investment rate in GDP or the rate of per capita capital growth to assess the effect of individual financial development indicators on other variables. Analysis of data from 80 countries between 1960-1989 using panel data illustrated a substantial correlation between financial development and economic growth at the national level (Caporale, Howells and Soliman, 2005, p. 166-175).

Nonetheless, the role of capital markets in fostering economic growth is not unequivocally positive. Some studies indicate that the liquidity involved in the buying and selling of shares within capital markets could adversely impact corporate governance, potentially decelerating economic growth. Despite these contrasting views, the preponderance of scholarly work endorses a positive relationship between capital markets and economic growth.

Over the years, a variety of models have been utilized to decipher the influence of financial and capital markets on the economies of different nations (Jin and Boubakari, 2010, p. 14-19). These studies have culminated in a series of key observations, leading to several overarching conclusions regarding the tested model:

- Stock market capitalization exhibits a substantial and statistically significant positive effect on the growth of real GDP and physical capital, highlighting the necessity for companies to invest in long-term projects within the real sector.
- A statistically significant relationship between the development of financial markets and economic growth was observed during the study period.
- The correlation between total bank assets and the exchange rate demonstrated a notable and statistically significant positive impact on real GDP growth.

3. A comprehensive empirical examination of the link between capital market and economic growth.

This comprehensive study utilized data from two key sources to assess the impact of capital market dynamics on Austria's economic growth: The World Bank and Statistics Austria. The period of investigation spanned from 1975 to 2020, with annual data being systematically collected for empirical analysis. Notably, the dataset commences from 1975, as this was the earliest year for which suitable data for econometric evaluation was available. Additionally, the analysis did not extend beyond 2020 due to the non-availability of certain critical statistics in the recent years, which would have necessitated the omission of other significant variables.

The study's scope was deliberately confined to data up until 2020, partly due to the advent of the COVID-19 pandemic and the subsequent military conflict in Ukraine initiated by the Russian Federation. These global events ushered in a period of exceptional economic turmoil and unpredictability, making any data post-2020 potentially unrepresentative of standard economic conditions due to the extraordinary nature of these events.

The study did not factor in the economic impact of these global events and instead focused on an annual analysis of various economic indicators. These indicators included GDP (Gross Domestic Product), CAPINV (capital investments), HOUCON (household consumption), EX (exports of goods and services), IM (imports of goods and services), GOV (government expenditure), KAP (stock market capitalization), NUMCOM (number of listed companies), and POP (population size). The financial data was meticulously collected and harmonized into a consistent unit of account. The values were adjusted using the 2015 deflator to ensure accurate valuation over time and converted into a logarithmic form for easier computation.

The research utilized a modified version of the Economic Growth Regression Model developed by R. Levin and R.G. Barro to examine the relationship between financial development and economic growth. This model was particularly adept at exploring the nexus between capital market activities and economic expansion, employing the GRETl software

for computational purposes (Filipowicz, 2019, p. 19-36). The model specifically focused on the natural logarithm of real GDP and included variables like real stock market capitalization, capital investments, and government expenditure.

Equation 2: Author's econometric model examining the influence of the capital market on economic growth in Austria

$$\ln GDP_t = a_0 + a_1 \ln KAP_t + a_2 \ln CAPINV_t + a_3 \ln GOV_t + u_t$$

Where:

- $\ln GDP_t$ represents the natural logarithm of real Gross Domestic Product;
- $\ln KAP_t$ denotes the natural logarithm of real stock market capitalization;
- $\ln CAPINV_t$ indicates the natural logarithm of capital investments;
- $\ln GOV_t$ signifies the natural logarithm of government expenditure.

The model was developed using the stepwise backward regression method. The structural parameters' estimation hinged on the advantageous properties of the estimators obtained from the Classical Linear Regression Model (CLRM). However, the study revealed that the residuals of the model were incorrectly distributed, presenting as long tails. Conventional methods such as the Prais, Cochran-Orcutt, and GLS approaches were inadequate, as models estimated using these methods failed to comply with the assumptions of classical regression.

In the realm of financial modeling, the assumption that a random component adheres to a normal distribution often does not hold. This study confirmed that the least squares estimator is imprecise for financial series, impacting the efficacy of commonly used tests due to inaccurate variance estimations. Hence, alternative methods are necessary for accurate variance estimation and to conduct a proper analysis (Maciejewska, 2008, 534-537).

The research also incorporated a GARCH (Generalized Autoregressive Conditional Heteroskedasticity) model, which is adept at predicting financial time series characterized by fat tails or high variance aggregation. This model particularly emphasizes one-shot phenomena, where a single deviation in a time series differs markedly from the predicted value, impacting the series without affecting other time periods (Domańska, 2020, 122-128). The outcomes of the GARCH model estimations are presented in Table 1, offering insightful conclusions about the influence of capital markets on Austria's economic landscape.

Table 1. Model: GARCH estimation, observations used 1975-2020 (T = 46). Dependent variable (Y): lnGDP. Standard errors of Quasi-Maximum Likelihood

GARCH, using observations 1975-2020 (T = 46)					
Dependent variable: I_GDP					
QML standard errors					
name	coefficient	std. error	z	p-value	significance level
const	1,69860	0,0202707	83,80	0,0000	***
I_KAP	0,00891460	0,00318102	2,802	0,0051	***
I_CAPINV	0,216470	0,0306507	7,062	1,64e-012	***
I_GOV	0,745289	0,0287029	25,97	1,21e-148	***
alpha (0)	0,000323960	8,34547e-05	3,882	0,0001	***
Mean dependent var	4,843130	S.D. dependent var	1,100614		
Log-likelihood	119,5313	Akaike criterion	-227,0627		
Schwarz criterion	-216,0908	Hannan-Quinn	-222,9525		
Unconditional error variance = 0,00032396					
Test for normality of residual -					
Null hypothesis: error is normally distributed					
Test statistic: Chi-square (2) = 8,8385					
with p-value = 0,0120432					

*** - the variable is significant at the significance level of 0.01,

** - the variable is significant at the significance level of 0.05,

* - the variable is significant at the significance level of 0.1.

Source: Own study based on the GRETL program.

To accurately estimate the parameters of a model using the maximum likelihood method, it is imperative to make certain presumptions about the model's probability distribution. When these assumptions are appropriately adhered to, it becomes possible to achieve parameter estimations that are asymptotically efficient. In the realm of GARCH (Generalized Autoregressive Conditional Heteroskedasticity) model estimation, Quasi-maximum-likelihood methods are routinely employed due to their effectiveness. A distinctive characteristic of GARCH models, particularly when applied

to financial data, is their ability to account for the 'fat tail' phenomenon. This aspect of the GARCH models is crucial as it enables researchers to arrive at consistent parameter estimations even in scenarios where the distribution deviates from normality. This feature stands in contrast to the outcomes typically observed when employing Ordinary Least Squares (OLS) model estimation with normal distributions (Fiszeder, 2009, 21- 24).

A detailed examination of the data presented in Table 1 reveals that every explanatory variable within the model holds statistical significance. Notably, variations in capital investment exert a considerably significant positive influence on the fluctuations of the economic growth rate. This finding indicates that capital investment is a key driver in modulating the pace of economic growth. Moreover, alterations in market capitalization, though having a relatively modest effect, positively influence the volatility of economic growth rates. These observations suggest that the necessary conditions to affirm the capital market's positive impact on Austria's economic growth have been established.

The study's findings, therefore, underscore the integral role of capital markets in shaping Austria's economic landscape. The positive correlation between capital investment and economic growth rate fluctuations suggests that strategic investments in the capital market can act as catalysts for economic expansion. Additionally, the influence of market capitalization, albeit smaller, points to the broader effects of financial market dynamics on the economy. This comprehensive analysis, grounded in robust statistical methods, provides compelling evidence of the capital market's instrumental role in fostering economic growth, highlighting its importance as a key factor in Austria's economic development strategy.

4. Conclusion

The empirical research conducted robustly establishes the significant link between the evolution of capital markets and the economic growth of Austria. The study employed a detailed model which, under the assumption of other variables remaining constant, elucidates the direct impact of changes within the capital market on the nation's Gross Domestic Product (GDP). This assumption is key to isolating the specific effects of capital market dynamics from other economic factors.

According to the model's findings, every one percent increment in capital investment correlates with an approximate 0.22 percent increase in the GDP. This substantial relationship highlights the potent influence of capital investment in driving the country's economic output, underscoring its vital role in economic stimulation and growth.

Furthermore, the model indicates that a one percent rise in market capitalization is associated with an about 0.01 percent uplift in the GDP. Although this effect might seem modest compared to that of capital

investments, it is still noteworthy. It reflects the broader impact of the stock market's health on the economy, influencing investor confidence and the effectiveness of capital allocation within the market.

Additionally, the analysis reveals that a one percent increase in government expenditure could potentially elevate the GDP by approximately 0.75 percent. This significant impact suggests that government spending is a crucial driver of economic activity, likely fueling public investments, stimulating demand, and thus, contributing to overall economic expansion.

Under the premise that other economic variables maintain their stability, these findings offer a nuanced understanding of the interconnectedness between capital market developments, government spending, and Austria's economic growth. By meticulously separating the influence of these specific variables, the research provides a clearer insight into their respective roles and the extent of their impact on the nation's economic trajectory. This analytical clarity is of immense value, particularly for policymakers and economic strategists, in formulating policies and investment strategies that capitalize on these dynamics for enhanced economic prosperity.

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